RESEARCH NOTES
SOUTHWESTERN FOREST AND RANGE EXPERIMENT STATION 1/
Raymond Price, Director

Note No. 110 December 1944

Entomology & Plant Quarantine
RECEIVED
☆ MAR 23 1945 ☆
Forest Insect Laboratory,
BERKELEY, CALIF.

FS RS
RECEIVED
MAR 21
REFERRED TO
TIMBER MANAGEMENT

DESTRUCTIVE INSECTS ON PINYON (PINUS EDULIS)

By Elbert L. Little, Jr., Dendrologist 2/

This summary of the common destructive insects on pinyon trees (Pinus edulis Engelm.) in New Mexico and Arizona may serve as a reference to Forest Service officers in connection with the reports on insect damage on the national forests made annually. It may be of assistance also in observing the kind and amount of insect damage to cones and seeds and in making predictions of pinyon nut crops. The author's longer Journal article, from which the information in this Research Note is taken, contains more details and data on other kinds of insects found on pinyons also. 3/

The most destructive insects on pinyon trees are those in the cones and seeds, which destroy large portions of the marketable crops of pinyon nuts each year. These insects are of greatest economic importance, even though they do not kill the trees, because the edible seeds, or pinyon nuts, are the most valuable product. Various other destructive insects are found in the bark and foliage.

Insects in Cones and Seeds

The cones and seeds are attacked by insects of various kinds during their 2-year period of development. Fortunately, however, pinyon nuts are not attacked by weevils or other insects after maturity and keep well for a few years when stored in dry climates, such as in southwestern United States. Many seeds die from other causes than insects. Production of empty seeds, known as blighting or blasting, in cones not attacked by insects, sometimes is common.

1/Maintained by the Forest Service, U. S. Department of Agriculture, for Arizona, New Mexico, and west Texas, with headquarters at Tucson, Ariz.

2/The information was obtained while the author was with the Southwestern Forest and Range Experiment Station. He transferred from the Station to the Division of Dendrology and Range Forage Investigations, Forest Service, Washington, D. C. He is now senior botanist, Foreign Economic Administration, Bogotá, Colombia.

3/Little, Elbert L., Jr. Common insects on pinyon (Pinus edulis). N. Y. Entom. Soc. Jour. 51:239-252. 1943.

There is a high mortality of pinyon cones from insects the first year, though the loss is much less conspicuous than that of the larger cones the second year. The young cones emerging from the buds for pollination in June or May are soft and glandular for a few weeks until the cone scales form a hard surface. Miscellaneous insects feed upon these young cones and kill a small portion. Destruction of cones the first year, when less than 1/2 inch long, is caused principally by larvae of unidentified gall midges (family Cecidomyiidae). These white larvae, less than 1/8 inch long, are active in July and August, when they feed on the young seeds and soft tissues at the base of the cone scales. The infested cones usually die in August, shrivel slightly as they dry, and fall off when touched. When examined, they are usually hollow and show no evidence of insects.

Great destruction of cones and seeds occurs the second year. Cones are killed both before and after they reach their full size of about 1-1/2 inches long early in July. Caterpillars of four or five species of moths are especially active in the cones in June and destroy many cones and seeds in June, July, and August. They are mostly pine cone moths (Eucosma bobana Kearf.?). Two species of Dioryctria and apparently a third species of a different genus of the same family (Phycitidae) are represented also. These whitish to brown larvae become 1/4 to 3/4 inch long. They bore into the green cones and feed upon the soft tissues of the cone scales and upon the seeds. To a certain extent these larvae attack both tips of young shoots and the developing cones. A cone attacked by larvae in June, when it is relatively soft, shrivels somewhat and turns brown. It may remain on the tree as a shrunken dead cone or may fall prematurely. The contents have been reduced to a powdery mass by the insect larvae. Insect damage to cones attacked later in the season, as in July and August, may be less severe. At this time the tissues of the cone are becoming harder and the hard seed coats are forming. If most or all of the seeds are destroyed by the insect larvae, the cone usually does not open at maturity but turns brown prematurely. Holes made by the larvae and excessive secretions of resin are external evidences of insect work. If only part of the cone and seeds are destroyed, the cone may bear some normal seeds and open some scales at maturity.

Larvae of small weevils (Conotrachelus sp.) are common and destructive in pinyon cones in June and July.

Pinyon cone beetles (Conophthorus edulis Hopk.) are very destructive to the cones the second year but apparently do not cause as much damage as the caterpillars. The adults, small dark brown beetles less than 1/8 inch long, are active in the cones in June and July. They enter cones by boring into the stalk at the base, tunnel through the cone tissues and seeds, and kill the cone. A cone with contents destroyed by pinyon cone beetles dies and turns brown early and does not open its scales in autumn. Usually work of pinyon cone beetles can be recognized by the presence of several round pinholes formed on the outside of the cone when the beetles emerge.

Insects in Bark

Of all the insects on pinyons, bark beetles (genera Ips, Dendroctonus, and Pityophthorus) have attracted the most attention among foresters. The commonest bark beetles attacking pinyons are known as Ips or engraver beetles. In New Mexico and Arizona the principal species on pinyons probably is the Arizona five-spined engraver (Ips lecontei Sw.). These light to dark brown beetles less than 3/16 inch long appear to be mainly secondary in the bark, as they attack weakened, injured, and dying pinyon trees, especially those affected by drought or on poor sites. Except in the infrequent epidemics, only a few trees are attacked at a time, the loss is not great, and control measures are not needed.

Nearly all the references to insects on pinyons contained in the annual reports on insect control on the national forests of New Mexico and Arizona are about bark beetles, or Ips. For example, in 1925 and 1926 there was a serious infestation of Ips, attributed partly to drought, on Chupadera Mesa, Cibola National Forest, New Mexico. From 10 to 50 percent of the pinyon trees in different places were killed, but only a few died in 1927. A severe epidemic of Ips, starting from blown-down timber, killed from 50 to 75 percent of the pinyon trees in a large area along the west slopes of the Sacramento Mountains, Lincoln National Forest, New Mexico, in 1925. Drought-weakened trees on the shallow-soiled, dry western slopes were attacked also. The great bulk of the trees turned brown during the last of June and July, but a few died later and in 1926.

The Black Hills beetle (Dendroctonus ponderosae Hopk.) attacked pinyons on the Kaibab National Forest, Arizona, during the epidemic of 1924 and 1925.

Insects on Foliage

The main insects on the foliage of pinyon trees include scale insects, pine tip moths, caterpillars, gall makers, aphids, cicadas, and ants. Most of these do not kill the trees but cause only slight damage or are unimportant.

The pine needle scale (Chionaspis pinifoliae (Fitch)), which is common and widely distributed on the foliage of pines and other conifers throughout the United States, apparently is relatively uncommon on pinyon needles. The mature scale is white and almost 1/8 inch long. Heavily infested needles may die and fall prematurely, or a few trees may be killed.

Another species, the pinyon needle scale (Matsucoccus acalyptus Herbert) is generally infrequent on pinyon needles. The brownish or blackish body is about 1/8 inch long, but the stage more often seen is dark brown and only about 1/64 inch in length. Needles of the current year become dotted with many small scales and turn yellow and brown as they are killed. In severe attacks the needles drop off after the first year, leaving thin foliage composed of only the needles of the current year, and a number of trees may die.

Pine tip moths (Dioryctria sp.) are common on pinyon trees and often abundant near the lower altitudinal limit. The whitish caterpillars become 3/8 to 5/8 inch long, and the gray adult moths have a length of less than 1/2 inch. The larvae, which are active mainly in May and June, kill leaders, other terminal shoots, and terminal buds in the upper parts of mature as well as smaller trees. Pine tip moths do not kill the trees but kill a few shoots bearing young cones. They also may tend to increase the branching and crooked limbs, but the deformation is not very serious, as the low, spreading, much-branched pinyons seldom are used for lumber.

Practical Aspects

Bark beetles and scale insects may kill a few pinyon trees and in occasional epidemics kill a considerable number of trees over large areas of forest. Normally bark beetles destroy only a few weakened trees, which probably are not good bearers of nuts, and their epidemics usually subside within a year or two. It is doubtful that control of these insects would be practicable in most instances.

The greatest economic losses are caused by insects which attack the cones and seeds but do not kill the trees. For such insects no feasible means of control has been devised, and in any event it appears improbable that control operations would be economically justifiable under forest conditions.

It does seem desirable to make some allowances for probable destruction of cones and seeds by insects, when predictions or estimates of the pinyon nut crop are made a few months or longer in advance. At least a few young cones are formed by some trees in a locality each year, though in most years a particular locality has no commercial pinyon nut crop. When only a few cones begin development, mortality is proportionately high and the cone crop at maturity is a failure. Insects kill nearly all the cones of a light cone crop and destroy a smaller proportion of a heavy cone crop. Thus, if it is poor at the end of the first year, the cone crop almost certainly will be a failure at maturity a year later because of insect damage and other losses, such as blighting of seeds. Obviously, a commercial pinyon nut crop is not produced unless the total number of cones beginning development has greatly exceeded the number destroyed by insects before maturity and the total number of nuts ripening has greatly exceeded that eaten or stored by rodents before the crop could be harvested by humans.